

TOILET BOWL WITH VENTILATING SYSTEM

CROSS REFERENCES TO RELATED APPLICATIONS: Not applicable.

Statement as to rights to inventions made under Federally sponsored research and development: Not Applicable.

BACKGROUND OF THE INVENTION

1. Field of the Invention.

This invention relates to a toilet bowl designed to vent odious air therefrom. More specifically, it relates to a toilet bowl having a venting system for directing the odious air directly to the sewer system.

2. Background Information.

Numerous attempts have been made to provide venting systems for toilets in order to re-direct odious air. Typical prior art venting systems are generally distributed in the form of a kit to be attached to the toilet. These kits are normally installed external to the toilet and generally include a considerable number of components and fittings which are not only unsightly, since the components and piping remains exposed, but also difficult to install.

Other arrangements attempting to solve the problem of ventilating toilets includes using a conventional air blower to direct air from the toilet room to the outside. These type ventilating systems require expensive installation since a vent passageway must be made in a wall of the toilet room. Also, these air blower systems are generally exposed and unsightly.

Another arrangement for ventilating toilets is disclosed in U.S. Patent 6,173,453 to Shahar. '453 discloses a kit for venting a toilet that includes an exhaust line having one end connected to the sewer line and a second end within the toilet bowl. The exhaust line including an electrically operated exhaust fan to generate flow in the direction toward the sewer line, and a valve for preventing flow in a direction from the sewer line. The '453 disclosure is a kit generally installed external to the toilet. As such, the components and piping remain exposed. Further, '453 kit requires expensive installation since a passageway must be made in the floor near the toilet in order to direct the one end of the exhaust line for connection to the sewer line. Further, properly installing the exhaust line to the sewer pipe is difficult, inconvenient, and relatively unsanitary.

As will be seen from the subsequent description, the preferred embodiments of the present invention overcome these and other shortcomings of prior art.

SUMMARY OF THE INVENTION

The present invention is a toilet bowl having a venting system for directing odious air from the toilet bowl to the sewer system. The preferred embodiment includes a toilet bowl having a discharge outlet connected to a sewer line as is known in the art, a chamber defined within the upper-rear portion of the toilet bowl to substantially contain the components of the venting system, an exhaust hose positioned within the chamber and in communication with the discharge outlet, a housing positioned within the chamber and connected to the exhaust hose. A gate is hingedly fitted on a frame within the housing, the gate is rotated to an open position and a closed position depending on the operative position of the system. In the closed position, the gate prevents gas flow in the direction from the sewer line so as to prevent odious air from the sewer line. In the open position, the ventilation system is activated causing air flow to be directed through a vent opening in the toilet bowl to the sewer line. An electrically operated exhaust fan is positioned within the housing. When activated, the air flow from the fan is directed towards the gate urging

the gate to an opened position. When the exhaust fan is de-activated, air flow ceases allowing the gate to return to the closed position.

An electronic control unit is further disposed in the chamber and electrically connected to the exhaust fan. The control unit is further connected to a pressure sensor attached to the upper surface of a lip of the toilet bowl, so that lowering the toilet seat of the toilet bowl onto the lip causes contact between the toilet seat and the pressure sensor. When the weight of a person is placed on the toilet seat, the pressure sensor signals the control unit, causing the control unit to activate the exhaust fan. When the exhaust fan is activated, air flow from the fan urges the gate to an opened position. When the weight of the person is no longer resting on the toilet seat, the pressure sensor signals the control unit, causing the control unit to de-activate the exhaust fan. When the exhaust fan is de-activated, air flow from the fan ceases, allowing the gate to return to the closed position.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a section view of a preferred embodiment of the present invention, a toilet bowl with ventilating system.

Fig. 2 is a section view of the toilet bowl illustrating a section view of the ventilating system of Fig. 1, having the gate in a closed position.

Fig. 3 is a section view of the toilet bowl illustrating a section view of the ventilating system of Fig. 1, having the gate in an opened position.

Fig. 4 is an exploded view of the components of the ventilating system of Fig. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figs. 1-4 illustrate a preferred embodiment of a toilet bowl with ventilating system 10 made

in accordance with the present invention. As shown in Fig. 1 the system 10, like a standard toilet system includes a toilet bowl 20 which is adapted to receive liquid and solid waste, a tank 100 is typically mounted above the toilet bowl 20, and a handle (not shown) is mounted to the exterior surface of the tank 100 and attached to the flush system (not specifically shown) inside the tank 100 that generally initiates the flushing operation.

The toilet bowl 20 of the present invention includes a discharge outlet 25 that is connected to a sewer line 30, which is connected to the main sewer line (not shown). The toilet bowl 20, like a standard toilet system, defining a waste discharge path designated as Arrow "A" in Fig. 1 that during the flushing operation, directs contents 35 in the toilet bowl 20 from the toilet bowl 20, through the discharge outlet 25 and to the sewer line 30.

A chamber 40 is disposed within the upper-rear portion of the toilet bowl 20, directly above the discharge outlet 25. As will be further described, an exhaust hose 45 is generally positioned within the chamber 40 and extends to the discharge outlet 25 in order to communicate between the components within the chamber 40 and the sewer line 30.

As shown in the drawings, the exhaust hose 45 has a first end 45A and a second end 45B opposite the first end 45A. The exhaust hose 45 having a generally L-shaped configuration. The second end 45B of the exhaust host 45 is sealingly attached with seal 50D to an opening 42 in the chamber 40, the opening 42 in communication with the discharge outlet 25. The first end 45A of the exhaust hose 40 is releasably coupled to a first end 50A of a housing 50.

A gate 55 (shown in Figs. 2 and 3) is hingedly attached to a frame 55A, the frame 55A fitted within the housing 50 near a second end 50B of the housing 50. The second end 50B disposed opposite the first end 50A. The gate 55 is rotated to an open position (shown in Fig. 3) and a closed position (shown in Fig. 2) depending on the operative position of the system 10. As will be further described, in the closed position, the gate 55 prevents gas flow in a direction from the sewer line 30 so as to prevent the flow of

odious air from the sewer line 30. In the open position and as will be further described, the system 10 is activated causing air flow to be drawn in the direction of Arrows "B" in Fig. 3 namely, through a vent opening 22 in a rim 23 of the toilet bowl 20, such air flow being effectively directed from the toilet bowl, through the housing 50 and the exhaust hose 45, and to the sewer line 30. The gate 55 is preferably constructed of a soft metal or mild steel material.

An electrically operated exhaust fan 60 is disposed within the housing 50 and in particular, positioned downstream of the second end 50B of the housing 50. In particular, the fan 60 is disposed between the second end 50B and the gate 55. The second end 50B of the housing 50 is sealingly attached with seal 50C to the vent opening 22, the housing 50 in air flow communication with the vent opening 22.

As shown in Fig. 2, a surface end 64 is positioned immediately adjacent to the gate 55. In the preferred embodiment, the surface end 64 includes a center bore (not shown) for passage of air flow therethrough, and further includes a surface 64A along the perimeter of the surface end 64. The surface 64A including electromagnetic material so that when electricity is applied, the surface 64A produces a sufficiently strong electromagnetic force between the surface 64A and the gate 55, pulling the gate 55 into contact with the surface end 64, and in the closed position as shown in Fig. 2. When closed, an airtight seal is formed between the gate 55 and the surface 64A of the surface end 64. As will be further described, activating the fan 60 acts as a demagnetizing force allowing the gate 55 to open and allowing the passing of air through the venting system.

The vent opening 22 generally disposed along the rear portion of the rim 23 of the toilet bowl 20. Specifically, the vent opening 22 extends from the rim 23 of the toilet bowl 20 to the second end 50B of the housing 50. In the preferred embodiment, the vent opening 22 is formed within the rim 23 of the toilet bowl 20 and directed through the toilet bowl 20 to the chamber 40. Alternatively, the vent opening 22 may be a flexible

hose directed from the rim 23 of the toilet bowl 20, and sealing attached to the second end 50B of the housing 50. Further, as shown in the drawings, the vent opening 22 extends in an upwardly orientation from the lower surface of the rim 23 so that water, caused from the toilet's flushing operation for example, is unable to enter the opening 22 and access the components within the chamber 40.

An electronic control unit 70 is located in the chamber 40 with an electric supply line 72 electrically connected by electrical wiring 74 to the exhaust fan 60. The control unit 70 is further connected to a pressure sensor 80 by electrical wiring 74 as will be further discussed.

The toilet bowl 20 further having an access opening 37 and door 37A disposed on the outer surface of the toilet bowl 20 to allow access to the chamber 40 and the components therein. The access opening 37 and door 37A may be positioned either at the rear portion of the toilet bowl 20 as shown in the drawings or, on a side of the toilet bowl 20.

The toilet bowl 20 further includes a toilet seat 27 and a lid (not shown). The toilet seat 27 is pivotally connected to the upper surface of the toilet bowl 20 so that the seat 27 may lowered to rest upon the upper surface of the rim 23 of the toilet bowl 20.

Pressure sensor 80 is positioned on the upper surface of the rim 23 of the toilet bowl 20 so that lowering the toilet seat 27 onto the rim 23 causes contact between the lower surface of the toilet seat 27 and the pressure sensor 80. The pressure sensor 80 is activated (Fig. 3) when it comes in contact with the seat 27 with the additional weight of a person seated on the toilet seat 27. The sensor 80 is disengaged (Fig. 2) when the weight of the person is no longer on the toilet seat 27. The pressure sensor 80 is appropriately connected to the control unit 70 by means known in the art.

In application, the gate 55 of the system 10 is generally in a closed position that is, the gate 55 is in sealing engagement with the surface end 64 as discussed above in order

to prevent gas flow in the direction from the sewer line 30 so as to prevent odious air from the sewer line 30. When the weight of a person is seated on the toilet seat 27, the pressure sensor 80 signals the control unit 70, causing the control unit 70 to activate the exhaust fan 60. When the exhaust fan 60 is activated, the magnetic field of the surface 64A is withdrawn or demagnetized. The air flow from the fan 60 is directed towards the gate 55. The air flow from the exhaust fan 60 urges the gate 55 to an opened position. In the open position as shown in Fig. 3, the system 10 is activated causing air flow through the vent opening 22 in the toilet bowl 20, and directed through the housing 50 and the exhaust hose 45, to the sewer line 30.

In the open position as described above, odious air from the toilet bowl 20 is effectively flushed and ventilated therefrom, and discharged into the sewer line 30.

When the weight of the person is no longer resting on the toilet seat 27, the pressure sensor 80 signals the control unit 70, causing the control unit 70 to de-activate the exhaust fan 60. When the exhaust fan 60 is de-activated, air flow from the fan 60 ceases. A strong magnetic force is applied on the surface 64A. In response to the application of a magnetic field to the surface 64A, the magnetic force pulls the gate 55 into contact with the surface end 64, returning the gate 55 to the closed position and forming an airtight seal between the surface end 64 and the gate 55.

Once the control unit 70 receives the signal to de-activate the exhaust fan 60 as described above, the system 10 may immediately de-activate the exhaust fan 60 as described or, may continue its operation with the gate 55 remaining in the open position for several minutes, depending on predetermined programming of the control unit 70.

Finally, it should be understood by those of skill in the art that other modifications and changes can be made without departing from the spirit and the scope of the invention and without diminishing its intended advantages. For example, various electronic control means may be provided for activating and de-activating operation of the system.

Further, the exhaust fan 60 herein is described as being electrically operated however, it should be obvious that a battery operated exhaust fan 60 will achieve the desired objectives. Such changes, as well as other changes, are intended to be consistent with the invention described herein.

Although the description above contains many specificities, they should not be construed as limiting the scope of the invention but as merely providing illustrations of some of the presently preferred embodiments of this invention.

Thus, the scope of the invention should be determined by the appended claims in the formal application and their legal equivalents, rather than by the examples given.